

MINISTRY OF EDUCATION AND TRAINING
QUY NHON UNIVERSITY



PROGRAM

Level of education:	Doctor of Philosophy
Major:	Electrical engineering
Specicality:	Electrical engineering
Code:	9520201
Type of education:	Full-time

Bình Định, 2025

PROGRAM

*(Issued together with Decision No. /QĐ-ĐHQN dated , 2025
of the Rector of Quy Nhon University)*

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Major: **Electrical engineering**

Speciality: **Electrical engineering**

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1. PROGRAM OBJECTIVES

1.1. General objectives

The Doctoral Program in Electrical Engineering aims to train highly qualified scientists with advanced theoretical knowledge and appropriate application competencies, capable of mastering advanced technologies, conducting independent and creative research, identifying and solving new problems of scientific and technological significance, supervising scientific research, guiding students in their graduation projects and master's students in their theses/projects, and undertaking teaching duties.

1.2. Specific objectives (POs)

Upon completing the Doctoral Program in Electrical Engineering at Quy Nhon University, graduates will be able to:

+ PO1: Possess a comprehensive and advanced system of in-depth theoretical and practical knowledge associated with teaching, research, and application activities in the field of electrical engineering.

+ PO2: Demonstrate the ability to conduct independent and creative research, and to identify and analyze complex problems in order to propose innovative solutions for problem-solving.

+ PO3: Demonstrate the ability to manage and lead professional activities in research and to develop national and international collaboration networks in professional practice.

+ PO4: Demonstrate the ability to update and advance new knowledge, and to evaluate

issues and make expert-level decisions.

+ PO5: Demonstrate professional ethics and academic integrity; show responsibility to oneself, professional groups, and the community.

2. EMPLOYMENT OPPORTUNITIES AND FURTHER STUDY PROSPECTS

After graduation, graduates may take up the following positions:

- Teaching and conducting research at universities and academies both domestically and internationally.

- Managing and conducting research and development (R&D) at agencies and enterprises operating in the field of electrical engineering.

- Managing professional activities at educational and training institutions, and at science and technology research organizations in the field of electrical engineering.

- Participating in internship programs, collaborative research projects, and postdoctoral research in Vietnam and abroad.

- Serving as an expert in the field of electrical engineering.

3. PROGRAM LEARNING OUTCOMES (PLOs)

Graduates of the Doctoral Program in Electrical Engineering at the Quy Nhon University are able to:

PLO1: Conducting independent and creative research and contributing new knowledge to the field of electrical engineering in accordance with international academic standards.

PLO2: Analyzing complex problems in electrical engineering in depth and developing advanced solutions based on modern scientific and technological foundations.

PLO3: Applying advanced technologies in power systems to optimize system performance and stability.

PLO4: Developing modern scientific research methodologies in electrical engineering, including modeling and simulation.

PLO5: Building research teams and effectively managing science and technology projects in the field of electrical engineering.

PLO6: Presenting research results clearly and scientifically with strong academic and practical significance, and publishing papers in reputable national and international journals or scientific conferences.

PLO7: Adhering to professional ethics in scientific research and ensuring integrity and transparency in all activities.

Mapping of Program Objectives (POs) and Program Learning Outcomes (PLOs)

Program objectives (POs)	Program learning outcomes (PLOs)						
	1	2	3	4	5	6	7
PO1	x	x			x		
PO2			x	x			x
PO3				x		x	x
PO4	x		x				x
PO5		x			x		x

4. ADMISSION REQUIREMENTS

- Holding a master's degree, or graduating with excellent academic standing or higher from a relevant undergraduate program; or holding a qualification equivalent to Level 7 of the Vietnam National Qualifications Framework in certain specialized and intensive fields relevant to the doctoral program.

- Possessing a foreign language proficiency at Level 4 of the 6-level Foreign Language Proficiency Framework for Vietnam (or an equivalent or higher level).

- Demonstrating research capacity and experience through a master's thesis in a research-oriented program, or published scientific papers or conference reports, or having at least two (02) years (24 months) of professional experience as a lecturer or researcher at higher education institutions or science and technology organizations.

5. ADMISSION CATEGORIES

According to the current doctoral admission and training regulations of the Ministry of Education and Training and of Quy Nhon University.

5.1. Classification of admission categories

- *Admission category 1:* Applicants holding a Master's degree in the appropriate disciplines with electrical engineering.

- *Admission category 2:* Applicants holding a Master's degree in the closely related disciplines with electrical engineering.

- *Admission category 3:* Applicants holding a Bachelor's degree in the appropriate disciplines with electrical engineering with good academic performance.

5.2. List of appropriate and closely related academic disciplines

The list of appropriate and closely related academic disciplines applicable to the doctoral program in electrical engineering:

- Appropriate disciplines:

+ Holding a master's degree in one of the following fields: electrical engineering; power systems; electrical systems and energy; power networks and systems; electrical and electronic engineering; electrical and electronic equipment; industrial electrical engineering.

+ Holding a bachelor's degree with excellent academic standing in one of the following fields: electrical engineering; electrical and electronic engineering technology; electrical and electronic engineering.

- Related academic disciplines:

+ Holding a master's degree in one of the following fields: control and automation engineering; automatic control; electronics and telecommunications engineering; electronics and communication engineering; electronics and telecommunications; electronic engineering; telecommunications engineering; production automation; energy engineering; industrial engineering; industrial systems engineering; energy management.

** Other cases shall be considered and decided by the University Admissions Committee.*

6. PROGRAM DURATION AND TOTAL CREDITS

6.1. Program duration

- Program duration: From 03 years (36 months) to 04 years (48 months)
- Total program duration: Not exceed 06 years (72 months) from the effective date of the decision recognizing the doctoral candidate to the completion of all procedures for dissertation submission to the University.

6.2. Program structure

Part	Program content	Number of credits required for each admission category		
		Admission category 1	Admission category 2	Admission category 3
I	Supplementary courses	0	12	30
II	Doctoral-level courses	12	12	12
II.1	Compulsory courses	6	6	6
II.2	Elective courses	6	6	6
III	Scientific research and Doctoral dissertation	78	78	78

III.1	Scientific research	8	8	8
III.2	Doctoral dissertation	70	70	70
Total		90	102	120

6.3. Total credits

No	Program structure	Credits	Admission category		
			1	2	3
I. Supplementary courses			0	12	30
I.1. Compulsory			0	12	24
1	Philosophy of Marx – Lenin	3			3
2	Calculation and simulation of electromagnetic fields	3		3	3
3	Fuzzy system and neural networks	3			3
4	Advanced power system protection and control	3		3	3
5	Flexible alternating current transmission system and high voltage direct current	3			3
6	Smart grid	3		3	3
7	Power system analysis	3			3
8	Forecasting methods in power system	3		3	3
I.2. Elective			0	0	6
9	Electric power market	3			3
10	Electric machine control	3			3
11	SCADA for electrical power systems	3			3
12	Analysis and control of power system stability	3			3
13	Control in power electronics devices	3			3
14	Advances in high voltage engineering	3			3
II. Doctoral-level courses (Including Compulsory and elective courses)		12	12	12	12
II.1. Compulsory (6 credits)		6	6	6	6
15	Optimization of power system operation	2	2	2	2
16	Research project management and international publication	2	2	2	2
17	Modeling and high-performance control of electric machines	2	2	2	2
II.2. Elective (Select 2/5 courses - 6/15 credits)		6	6	6	6
Specialization: Power system					
18	Microgrid and energy storage system	3	3	3	3
19	Optimize and control systems renewable energy	3	3	3	3
20	Wide area monitoring, control and protection techniques for power systems	3	3	3	3
21	Nonlinear optimization methods and applications in power systems	3	3	3	3
22	Artificial intelligence-based smart power systems	3	3	3	3

<i>Specialization: Electrical equipment</i>					
23	Vector control of three-phase electric machines	3	3	3	3
24	Modern methods in electrical equipment research	3	3	3	3
25	Advanced diagnostics and condition monitoring of electric machines	3	3	3	3
26	Advanced control of electric machines and drives	3	3	3	3
27	Parameter estimation of dynamic systems and applications in electric machines	3	3	3	3
III. Scientific research and Doctoral dissertation		78	78	78	78
III.1. Scientific research		8	8	8	8
28	Comprehensive literature review	2	2	2	2
29	Research topic 1	2	2	2	2
30	Research topic 2	2	2	2	2
31	Research topic 3	2	2	2	2
III.2. Doctoral dissertation		70	70	70	70
32	Doctoral dissertation	70	70	70	70
Total			90	102	120

7. TRAINING PROCESS AND GRADUATION REQUIREMENTS

7.1. Training process

The program is delivered under the credit-based system and complies with the current regulations and policies of the Ministry of Education and Training and Quy Nhon University.

7.2. Recognition of qualifications and awarding of the doctoral degree

The doctoral candidate shall be considered for recognition of the doctoral qualification and the awarding of the Degree of Doctor of Philosophy in Electrical Engineering when the following requirements are satisfied:

- a) The doctoral dissertation has been approved by the University-level Doctoral Dissertation Evaluation Committee;
- b) The doctoral candidate has submitted to the University (both printed and electronic copies) the final completed dissertation bearing the candidate's signature, the supervisor's confirmation, and the confirmation of the Chair of the Dissertation Evaluation Committee after all revisions and additions have been completed (if any);
- c) The doctoral candidate has submitted to the National Library of Vietnam (both electronic and printed copies) the dissertation abstract and the final complete version of the dissertation bearing the candidate's signature, the supervisor's signature, and the

University's confirmation.

8. ASSESSMENT METHODS AND GRADING SCALE

8.1. Grading scale

A 10-point grading scale is used for all forms of assessment of theoretical courses and scientific research activities.

For the doctoral dissertation: Assessment is conducted in accordance with the current regulations on doctoral admission and training issued by the Ministry of Education and Training and Quy Nhon University.

8.2. Forms of assessment, evaluation criteria, and weighting

Implemented in accordance with the current regulations on doctoral admission and training issued by the Ministry of Education and Training and Quy Nhon University. Specific criteria are detailed in the syllabus of each course.

8.3. Assessment methods

Implemented in accordance with the current regulations on doctoral admission and training issued by the Ministry of Education and Training and Quy Nhon University. The specific criteria are detailed in the course syllabus of each course.

9. CURRICULUM FRAMEWORK

No	Code	Course name	Year	Credits				Prior course code	Responsible Faculty	Admission categories
				Total	Lectures	Assignments	Practice/Experiment			
I. Supplementary courses				0						1
				12						2
				30						3
I.1. Compulsory				24						
1	BSKTĐ 01	Philosophy of Marx – Lenin	1	3	3	0	0		DPESM	3
2	BSKTĐ 02	Philosophy of Marx – Lenin	1	3	3	0	0		DET	2, 3
3	BSKTĐ 03	Calculation and simulation of electromagnetic fields	1	3	3	0	0		DET	3
4	BSKTĐ 04	Fuzzy system and neural networks	1	3	3	0	0		DET	2, 3

5	BSKTĐ 05	Advanced power system protection and control	1	3	3	0	0		DET	3
6	BSKTĐ 06	Flexible alternating current transmission system and High voltage direct current	1	3	3	0	0		DET	2, 3
7	BSKTĐ 07	Smart grid	1	3	3	0	0		DET	3
8	BSKTĐ 08	Power system analysis	1	3	3	0	0		DET	2, 3
I.2. Elective				6						3
9	BSKTĐ 09	Electric power market	1	3	3	0	0		DET	3
10	BSKTĐ 10	Electric machine control	1	3	3	0	0		DET	3
11	BSKTĐ 11	SCADA for electrical power systems	1	3	3	0	0		DET	3
12	BSKTĐ 12	Analysis and control of power system stability	1	3	3	0	0		DET	3
13	BSKTĐ 13	Control in power electronics devices	1	3	3	0	0		DET	3
14	BSKTĐ 14	Advances in high voltage engineering	1	3	3	0	0		DET	3
II. Doctoral-level courses				12						1, 2, 3
II.1. Compulsory				6						1, 2, 3
15	TSKTĐ 01	Optimization of power system operation Research project management and international publication	1	2	2	0	0		DET	1, 2
			2							3
16	TSKTĐ 02	Modeling and high-performance control of	1	2	2	0	0		DET	1, 2
			2							3

		electric machines optimization of power system operation								
17	TSKTĐ 03	Research project management and international publication	1	2	2	0	0		DET	1, 2
			2							3
II.2. Elective (Select 2/5 courses - 6/15 credits)				6						1, 2, 3
Specialization: Power system										
18	TSKTĐ 04	Microgrid and energy storage system Optimize and control systems renewable energy	1	3	3	0	0		DET	1, 2
			2							3
19	TSKTĐ 05	Wide area monitoring, control and protection techniques for power systems Nonlinear optimization methods and applications in power systems	1	3	3	0	0		DET	1, 2
			2							3
20	TSKTĐ 06	Artificial intelligence-based smart power systems Microgrid and energy storage system	1	3	3	0	0		DET	1, 2
			2							3
21	TSKTĐ 07	Optimize and control systems renewable energy wide area monitoring, control and protection techniques for power systems	1	3	3	0	0		DET	1, 2
			2							3
22	TSKTĐ 08	Nonlinear optimization	1	3	3	0	0		DET	1, 2

		methods and applications in power systems	2							3
Specialization: Electrical Equipment										
23	TSKTĐ 09	Vector control of three-phase electric machines modern methods in electrical equipment research	1	3	3	0	0		DET	1, 2
			2							3
24	TSKTĐ 10	Advanced diagnostics and condition monitoring of electric machines Advanced control of electric machines and drives	1	3	3	0	0		DET	1, 2
			2							3
25	TSKTĐ 11	Parameter estimation of dynamic systems and applications in electric machines Vector control of three-phase electric machines	1	3	3	0	0		DET	1, 2
			2							3
26	TSKTĐ 12	Modern methods in electrical equipment research Advanced diagnostics and condition monitoring of electric machines	1	3	3	0	0		DET	1, 2
			2							3
27	TSKTĐ 13	Advanced control of electric machines and drives	1	3	2	0	0		DET	1, 2
			2							3
III. Scientific research and Doctoral dissertation				78						1, 2 3
III.1. Scientific research				8						1, 2 3

28	TSKTĐ 14	Comprehens ive literature review Research topic 1	1	2					DET	1, 2
			2							3
29	TSKTĐ 15	Research topic 2	1-2	2					DET	1, 2
			2-3							3
30	TSKTĐ 16	Comprehens ive literature review Research topic 1	1-2	2					DET	1, 2
			2-3							3
31	TSKTĐ 17	Research topic 2	2-3	2					DET	1, 2
			3-4							3
III.2. Doctoral dissertation				70						1, 2 3
32	TSKTĐ 18	Doctoral dissertation	1-3	70					DET	1, 2
			2-4							3
Total				90						1
				102						2
				120						3

Matrix of the Relationship between Courses and Program Learning Outcomes

No	Course	PLOs						
		1	2	3	4	5	6	7
I	Compulsory (6 credits)							
1	Optimization of power system operation	M	M		M		M	
2	Research project management and international publication			M		M	M	M
3	Modeling and high-performance control of electric machines	M		M	M			
II	Elective (Select 2/5 courses - 6/15 credits)							
	<i>Specialization: Power system</i>							
4	Microgrid and energy storage system	M		M	M		M	
5	Optimize and control systems renewable energy	M		M	M		M	
6	Wide area monitoring, control and protection techniques for power systems	M		M	M		M	
7	Nonlinear optimization methods and applications in power systems	M		M	M		M	
8	Artificial intelligence-based smart power systems	M		M	M		M	

	<i>Specialization: Electrical Equipment</i>							
9	Vector control of three-phase electric machines		M	M			M	
10	Modern methods in electrical equipment research		M	M		M	M	
11	Advanced diagnostics and condition monitoring of electric machines		M	M		M	M	
12	Advanced control of electric machines and drives		M	M			M	
13	Parameter estimation of dynamic systems and applications in electric machines		M	M		M	M	
14	Comprehensive literature review	M		M		M		M
15	Research topic 1	M		M		M		M
16	Research topic 2	H		H		M		M
17	Research topic 3	M		H		H		M
18	Doctoral dissertation	H	H	H	H	H	H	H

Note: L = Low level; M = Medium level; H = High level

10. TENTATIVE TEACHING PLAN

N o	Code	Course name	Credit s	Teaching plan <i>(year)</i>				Proposed lecturers	Responsibl e Faculty	Admissio n categories
				1	2	3	4			
I. Supplementary courses			12							2
			30							3
I.1. Compulsory			12							2
			24							3
1	BSKTĐ01	Philosophy of Marx – Lenin	3	3				As assigned by the managing Faculty	DPESM	3
2	BSKTĐ02	Calculation and simulation of electromagnetic fields	3	3				Dr. Doan Thanh Bao, Assoc. Prof. Dr. Doan Duc Tung	DET	2, 3
3	BSKTĐ03	Fuzzy system and neural networks	3	3				Assoc. Prof. Dr. Doan Duc Tung, Dr. Le Tuan Ho	DET	3
4	BSKTĐ04	Advanced power system protection and control	3	3				Assoc. Prof. Dr. Huynh Duc Hoan,	DET	2, 3

							Dr. Nguyen Duy Khiem		
5	BSKTĐ0 5	Flexible alternating current transmission system and High voltage direct current	3	3			Dr. Le Tuan Ho, Assoc. Prof. Dr. Ngo Minh Khoa	DET	3
6	BSKTĐ0 6	Smart grid	3	3			Assoc. Prof. Dr. Ngo Minh Khoa, Assoc. Prof. Dr. Doan Duc Tung	DET	2, 3
7	BSKTĐ0 7	Power system analysis	3	3			Assoc. Prof. Dr. Ngo Minh Khoa, Dr. Le Tuan Ho	DET	3
8	BSKTĐ0 8	Forecasting methods in power system	3	3			Dr. Le Tuan Ho, Assoc. Prof. Dr. Huynh Duc Hoan	DET	2, 3
I.2. Elective			6						3
9	BSKTĐ0 9	Electric power market	3	3			Dr. Nguyen Xuan Tham, Dr. Le Tuan Ho	DET	3
10	BSKTĐ1 0	Electric machine control	3	3			Dr. Do Van Can, Dr. Doan Thanh Bao	DET	3
11	BSKTĐ1 1	SCADA for electrical power systems	3	3			Dr. Do Van Can, Dr. Le Tuan Ho	DET	3
12	BSKTĐ1 2	Analysis and control of power system stability	3	3			Dr. Nguyen Xuan Tham, Dr. Nguyen Duy Khiem	DET	3
13	BSKTĐ1 3	Control in power	3	3			Dr. Do Van Can, Assoc.	DET	3

		electronics devices						Prof. Dr. Huynh Duc Hoan		
14	BSKTĐ1 4	Advances in high voltage engineering	3	3				Dr. Le Tuan Ho, Assoc. Prof. Dr. Ngo Minh Khoa	DET	3
II. Doctoral-level courses			12							1, 2, 3
II.1. Compulsory			6							1, 2, 3
15	TSKTĐ0 1	Optimization of power system operation Research project management and international publication	2	2				Assoc. Prof. Dr. Ngo Minh Khoa, Dr. Le Tuan Ho	DET	1, 2
					2					3
16	TSKTĐ0 2	Modeling and high-performance control of electric machines Optimization of power system operation	2	2				Assoc. Prof. Dr. Doan Duc Tung, Dr. Doan Thanh Bao	DET	1, 2
					2					3
17	TSKTĐ0 3	Research project management and international publication	2	2				Dr. Doan Thanh Bao, Assoc. Prof. Dr. Doan Duc Tung	DET	1, 2
					2					3
II.2. Elective			6							1, 2, 3
Specialization: Power system										
18	TSKTĐ0 4	Microgrid and energy storage system Optimize and control systems renewable energy	3	3				Assoc. Prof. Dr. Ngo Minh Khoa, Dr. Nguyen Xuan Tham	DET	1, 2
					3					3

19	TSKTĐ0 5	Wide area monitoring, control and protection techniques for power systems Nonlinear optimization methods and applications in power systems	3	3				Dr. Nguyen Duy Khiem, Assoc. Prof. Dr. Ngo Minh Khoa	DET	1, 2
					3					3
20	TSKTĐ0 6	Artificial intelligence-based smart power systems Microgrid and energy storage system	3	3				Assoc. Prof. Dr. Huynh Duc Hoan, Dr. Nguyen Duy Khiem	DET	1, 2
					3					3
21	TSKTĐ0 7	Optimize and control systems renewable energy Wide area monitoring, control and protection techniques for power systems	3	3				Assoc. Prof. Dr. Doan Duc Tung, Dr. Nguyen Xuan Tham	DET	1, 2
					3					3
22	TSKTĐ0 8	Nonlinear optimization methods and applications in power systems	3	3				Dr. Le Tuan Ho, Assoc. Prof. Dr. Ngo Minh Khoa	DET	1, 2
					3					3
Specialization: Electrical Equipment										
23	TSKTĐ0 9	Vector control of three-phase electric machines Modern methods in electrical equipment research	3	3				Dr. Do Van Can, Assoc. Prof. Dr. Doan Duc Tung	DET	1, 2
					3					3
24	TSKTĐ1 0	Advanced diagnostics and condition monitoring of electric machines	3	3				Assoc. Prof. Dr. Doan Duc Tung, Dr. Doan Thanh Bao	DET	1, 2
					3					3

		Advanced control of electric machines and drives							
25	TSKTĐ1 1	Parameter estimation of dynamic systems and applications in electric machines Vector control of three-phase electric machines	3	3	3		Dr. Doan Thanh Bao, Dr. Do Van Can	DET	1, 2 3
26	TSKTĐ1 2	Modern methods in electrical equipment research Advanced diagnostics and condition monitoring of electric machines	3	3	3		Dr. Do Van Can, Dr. Le Nam Duong	DET	1, 2 3
27	TSKTĐ1 3	Advanced control of electric machines and drives	3	3	3		Dr. Doan Thanh Bao, Assoc. Prof. Dr. Doan Duc Tung	DET	1, 2 3
III. Scientific research and Doctoral dissertation			78						1, 2 3
III.1. Scientific research			8						1, 2 3
28	TSKTĐ1 4	Comprehensive literature review	2				Lecturers of DET and visiting lecturers (if any)	DET	1, 2, 3
29	TSKTĐ1 5	Research topic 1	2				Lecturers of DET and visiting lecturers (if any)	DET	1, 2, 3
30	TSKTĐ1 6	Research topic 2	2				Lecturers of DET and visiting lecturers (if any)	DET	1, 2, 3

31	TSKTĐ1 7	Research topic 3	2					Lecturers of DET and visiting lecturers (if any)	DET	1, 2, 3
III.2. Doctoral dissertation			70							1, 2, 3
32	TSKTĐ1 8	Doctoral dissertation	70					Faculty- level and University- level Doctoral Dissertatio n Evaluation Committee s.	DET	1, 2, 3
Total			90							1
			102							2
			120							3

Note:

- Scientific research tasks and the doctoral dissertation are carried out from the first year for candidates in the admission categories 1 and 2, and from the second year for candidates in the admission category 3.

- The minimum total number of credits for coursework in the program is 30 credits per year.

11. GUIDELINES FOR PROGRAM IMPLEMENTATION

- This program is implemented starting from the 2025 admission cohort.

- The training process is based on the designed curriculum, training objectives, target learners, human resource requirements, and specific requirements for the program. For elective courses, depending on practical conditions, development trends, and social demands, the department managing the program will advise doctoral candidates in selecting appropriate courses.

- The Dean of Department of Engineering and Technology is responsible for organizing and guiding the principles for curriculum development and detailed course syllabi to ensure that the objectives, content, and requirements are met, while also satisfying the needs of learners and society.

- The training program is periodically reviewed and updated in accordance with current regulations to meet the development of the field of electrical engineering and to align with

socio-economic development needs./.

12. DETAILED INFORMATION OF COURSES

See Appendix: Detailed information of courses.

Binh Dinh, , 2025

RECTOR